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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,228	06/20/2006	Frank Duvinage	095309.57266US	5467

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EXAMINER	
LIAO, DIANA J	
ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
10/23/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,228	DUVINAGE ET AL.	
	Examiner	Art Unit	
	DIANA J. LIAO	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/23/2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/23/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. PCT/EP04/06468, filed on 6/16/2004.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 12/23/2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "*the exhaust-gas-side surface* of the catalytically active coating" in the last portion of the claim. Claim 6 also mentions "an exhaust-gas side" at the end of the claim. There is insufficient antecedent basis for this limitation in the claim. The "exhaust-gas-side" is not defined earlier in the claims.

Claims 2-8 recite "The apparatus" in the preamble of the claims. There is insufficient antecedent basis for this limitation in the claim. There is no mention of an "apparatus" in claim 1, from which they depend.

Claim 7 recites that the catalytically active coating is applied "in the form of a gradient". The coating includes a first and second region, as well as possibly a diffusion layer. It must be made clear what the gradient will entail for each of the layers. For example, the gradient of the coating may refer to the whole including the diffusion layer, of just the first and/or second regions, or perhaps of any one of the regions and combination thereof.

The broad nature of the term "exhaust" generally raises issues of clarity. The system of claim 1 recites that it is for the cleaning of exhaust gas. However, one of ordinary skill in the art may also consider the resulting processed gas as exhaust gas, since the definition of exhaust gas is very broad, and at no point in time does the gas stream become not exhaust gas. As a result, the term "exhaust-gas side" is not well defined. For purposes of examination, the term "exhaust-gas side" is interpreted to be the upstream inlet side of the structure.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalla Betta, et al. (US 5,258,349) in view of Brueck (US 5,506,028) and Carmello, et al. (US 5,841,009).

Dalla Betta '349 teaches a catalyst suitable for use in controlling pollution from sources such as from automobiles. The catalyst is a graded palladium catalyst where there are regions of differing palladium activities. (claim 1) In one embodiment, there is a layer of high activity palladium (126) with two layers deposited over of decreasing activities (128, 130). The layers, illustratively, are also cascaded in a way such that the upstream portion of the substrate contains 3 layers of differing activities and the downstream end of the substrate has one layer. (Fig 1d) The catalyst may also employ a diffusion barrier to limit the fuel which reaches the catalyst and thus the reaction rate and temperature, and/or a metal substrate resistant to thermal shock. (col 4, lines 1-8) The diffusion barrier may also be applied to only a portion of the surface of the catalyst. (col 11, lines 21-27)

Dalla Betta '349 does not qualify the catalyst regions in terms of light off activity. However, Dalla Betta '349 does teach the catalyst layers in terms of activity. Dalla

Betta '349 discusses that the graded catalyst and support of its disclosure offers a low light-off temperature, but does not cause hot spots due to excess activity. (col 5, lines 40-45) This discussion appears to suggest that normally, a low light off temperature would mean excess and high activity. Thus, since Dalla Betta '349 teaches one embodiment to contain layers of catalyst with the bottom layers being of higher activity, Dalla Betta '349 suggests a catalyst with the bottoms layers having a low light off temperature compared to those above it, which would have higher light off temperatures.

Regarding having predominantly a second region (low light off temperature) in the catalytic coating, it would have been obvious to optimize the amounts of each region of the coating in order to achieve an overall catalytic activity at the desired or given operating temperature.

Dalla Betta '349 also does not specify the heat resistance of the regions of the catalyst. Dalla Betta '349 teaches that the different activities of the layers of the catalyst are achieved by means such as palladium concentration and surface area (col 8, line 65-col 9, line 9), the higher of which will lead to a higher activity and as discussed above, a lower light off temperature. A material with a high surface area would heat up faster due to increased contact, leading to a lower heat resistance. A higher concentration of palladium would result in a lower concentration of support oxide, known for their high temperature resistance, leading to a lower heat resistance. Therefore, Dalla Betta '349 does teach or suggest that regions of low light off temperatures have

lower temperature resistance and high light off temperatures have higher temperature resistance.

Dalla Betta '349 does not discuss specific heat capacity. However, Dalla Betta '349 does address the issue of hot spots and suggests that they are not desirable. As is taught by Dalla Betta '349, the reactions catalyzed normally create high temperature zones. For the temperature to be even, the temperature of the inlet side and the discharge side of the catalyst structure should be as close as possible. In order to prevent the area of initial contact from overheating, one of ordinary skill in the art would have been motivated to provide a higher heat capacity at the intake region in order to prevent initial overheating as the reactants pass over the inlet side of the catalyst. One of ordinary skill in the art would have also been motivated to provide a lower heat capacity towards the discharge side in order to allow the downstream side of the catalyst to heat up quickly to an even temperature.

Dalla Betta '349 does not teach the use of a cone shape or a structure with a lower cell density upstream and a higher cell density downstream. Dalla Betta '349 also does not teach a catalyst profile where the second region (having a low light off temperature) is directed towards a side away from the exhaust

Regarding the cone shape and cell density, Brueck '028 teaches a conical honeycomb body. The conical honeycomb may receive a catalytic coating. Since the

honeycomb has less mass than its cylindrical counterpart, it heats up more quickly and evenly. (col 2, lines 5-14)

A honeycomb shape entails a body with passages through which a fluid can flow. In a conical shape, if the passages are to extend from inlet to outlet, then the openings at the larger inlet need to be larger to make up for the space. These larger openings compared to the smaller downstream exits lead to a lower cell density at the intake region of the catalyst structure, and a higher cell density at the discharge region.

One of ordinary skill in the art would have been motivated to combine this conical shape with the catalytic coating of Dalla Betta '349 in order to attain a structure which heats up faster and more evenly, as hot spots are not desirable. Dalla Betta '349 also mentions that a metallic honeycomb would be desirable as a support due to high heat conduction.

Regarding different catalyst loading, Carmello '009 teaches a process wherein the creation of hot spots is also not desirable. Carmello '009 teaches that it is known the art to alter the activity profile of a catalyst within a fixed bed for use in an exothermic reaction such that the activity increases in the direction of flow. (col 1, lines 45-48) the specific implementation of this strategy is done by using catalyst layers wherein the first layer is of a high activity to initiate the reaction, the second layer is of a lower activity to control the temperature, and the third layer is high activity, wherein the layer itself is further profiled to increase activity in the direction of flow. The layers are configured so that the temperature never exceeds a set value. (col 2, lines 25-49)

Even though Carmello '009 is drawn to a fixed bed catalyst configuration, the general teaching of reducing hot spots and profiling so that there is a layer of lower activity catalyst and higher activity catalyst still applies to the exothermic reaction of Dalla Betta '349. It would have been obvious to one of ordinary skill in the art to profile the catalyst in such a way as to maintain a constant temperature throughout the catalyst structure. According to the general teachings of Carmello '009, another possible way to achieve this is to have catalyst of higher activity downstream. In addition, in view of Brueck '028, a conical structure would require more heat towards the larger, downstream end of the structure in order to achieve even heating and temperature. Therefore, one would have been further motivated to include higher activity catalyst downstream towards the discharge end in order to facilitate heating. As discussed earlier, a higher activity catalyst is found to have a lower light-off temperature property.

Therefore, due to motivation to reduce hot spots and optimize, claims 1-8 are not found patentable over the prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DIANA J. LIAO whose telephone number is (571)270-3592. The examiner can normally be reached on Monday - Friday 8:00am to 5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/
Primary Examiner, Art Unit 1793

DJL